

ABSTRACT OF THE DISCLOSURE

The present invention provides an ion implantation method which can achieve sufficient throughput by increasing a beam current even in the case of ions with a small mass number or low-energy ions, an SOI wafer manufacturing method, and an ion implantation system. When ions are implanted by irradiating a semiconductor substrate with an ion beam, predetermined gas is excited in a pressure-reduced chamber to generate plasma containing predetermined ions, a magnetic field is formed by a solenoid coil or the like along an extraction direction when the ions are extracted to the outside of the chamber, and the ions are extracted from the chamber with predetermined extraction energy. The formation of the magnetic field promotes ion extraction, but this magnetic field has no influence on an advancing direction of the extracted ions. Therefore, the ion beam current can be kept at a high level to contribute to the ion implantation.